From:	Gravatt, Dan
To:	Tapia, Cecilia; Hammerschmidt, Ron; "Warren, Victoria"; Paul Rosasco; Muenks, Shawn
Cc:	Ammon, Doug; Openchowski, Charles; Walker, Stuart; Bartenfelder, David; jschu@usgs.gov
Subject:	EPA ORD technical Comments on West Lake Landfill Modeling SOW
Date:	Tuesday, September 17, 2013 2:53:03 PM
Attachments:	TAR7 West Lake Landfill Modelling Work Plan.docx

Attached please find additional comments on the Supplemental SFS workplan for fate and transport modeling, as provided by Ed Barth of EPA's Office of Research and Development. These will be discussed at the meeting next Tuesday, September 24th along with the other comments previously provided. I anticipate one more set of comments from USGS, and hopefully I will be able to disseminate them tomorrow.

Sincerely,
Daniel R. Gravatt, PG
US EPA Region 7 SUPR/MOKS
11201 Renner Boulevard, Lenexa, KS 66219
Phone (913)-551-7324

Principles and integrity are expensive, but they are among the very few things worth having.

From: Barth, Edwin
Sent: Tuesday, September 17, 2013 12:59 PM
To: Gravatt, Dan
Cc: McKernan, John; Timberlake, Dennis
Subject: technical Comments - West Lake Landfill Modeling SOW

Dan, attached are my concerns/suggestions on the modeling work plan, they are not meant to be critical but solely to improve the modeling approach (accuracy). I did not cc Cecilia, I will leave that up to you after your review.

Unfortunately, I now have a conflict with the afternoon of the 24th, as I am required to take some furlough hours off, so I may not be on the teleconference after 1:00 EST.

Edwin F. Barth, Ph.D., P.E., C.I.H., R.S.
Office of Research and Development
U.S. Environmental Protection Agency
26 W. Martin Luther King Drive
Cincinnati, OH 45268
Telephone: (513)-569-7669
E-mail: barth.ed@epa.gov

Comments on West Lake Landfill Modeling Scope of Work and Schedule Work Plan – Fate and Transport Modeling (dated 4/19/2013)

EFB 09/15/13

The overall proposed approach integrating several model components is acceptable and appears to be a valid process for estimating subsurface transport. However, modeling outputs are impacted by input data quality, scenario limitations, and whether all relevant parameters are provided as input into the models. The following comments are offered to better improve or understand the modeling effort, noting that no comments are provided regarding the brief description of model validation and parameter sensitivity analysis:

The projected modeling study is limited by only considering one cover design scenario – the existing alternative cap design. No alternative such as a composite liner (clay/geomembrane) in the cap is being evaluated. Note that prediction studies involving MSW *subsurface* composite lining systems have shown (over time) to be superior to cohesive soil liners and projected to last greater than 600 years. Such composite liner systems would most likely be governed by diffusion, not advective transport as the proposed model anticipates.

The projected modeling reporting only accounts for one time scenario (1000 years); other time increments are suggested (unless a time profile graph is to be produced with the study) to see if an earlier breakthrough year is possible.

The projected modeling does not seem to account for the initial subsidence due to waste consolidation as well as any possible subsidence due to waste degradation, debris void space, the possibility of karst areas in the limestone/dolomite bedrock, and for the proximity to the New Madrid earthquake fault line. Subsidence would decrease travel distance (thus transport time), unless such subsidence results in greater particle consolidation which would decrease hydraulic conductivity.

The projected geochemical speciation component of modeling does not seem to account for subsurface temperatures of 40 – 60 C which have been documented (again with synthetic *subsurface* composite liners).

The geochemical speciation modeling component needs to accurate predict pH if there is still biological degradation and chemicals introduced by the proposed cover system, as the co-precipitation of metals with iron is highly pH dependent. The speciation model should consider that crushed cement in the cap may contribute to pH changes, as well as potentially introduce other heavy metals and/or redox changes if it contains slag or fly ash.

The subsurface, geochemical transport model does not indicate how (or if) site-specific partitioning coefficients will be literature-based or laboratory determined. Values may be available from OIAR published reports. For examples, portioning would be impacted by the alluvium TOC level or presence of surface charges. The model seems to rely solely on literature solubility values. Other geochemical speciation models such as MINTEQ are routinely used by EPA.

Without a subsurface liner and leachate collection system, some form of moisture control should be considered for “mummification” of the land disposal area. The projected modeling does not account for lower moisture conditions if the landfill is passively vented, especially if there are large atmospheric pressure changes in this area. No gas capture system for gases such as Radon (and possibly Thoron?) is indicated.

Is the specified hydraulic conductivity is 1 EE (-5 cm/s) correct as compared to the more typical specification of 1 EE (-6) cm/s? The specified value should be less than the subsurface drainage formation hydraulic conductivity to minimize a bathtub effect. This subsurface value was not provided nor was the process for determination (lab or field) provided. What are the advantages/disadvantages to clay over silt as briefly mentioned (but not discussed) in the work plan, especially in terms of shielding, adequate material quality (QC), and placement? Shrink/swell due to humid environments or temperature changes, ion exchange capacity (for crushed concrete ion contribution) should be part of this discussion.

Has the EPA, 1996 method for leachate depth penetration been further evaluated and improved over the years?

Are any components of the proposed armoring layer (particle size distribution not provided) included in the HELP model?

Does the subsurface ground water model account for any possible ground water gradient reversal (if any) due to exceedingly high river-stage levels?